

—The three following papers were read by title :

NEUROPTEROID INSECTS FROM ARIZONA.

By NATHAN BANKS.

The following species of Neuropteroid insects were captured by Messrs. E. A. Schwarz and H. S. Barber in Arizona in 1901. I have included some taken by Mr. E. J. Osler during the season of 1902, by Mr. H. G. Hubbard in the year 1897, by Messrs. Hubbard and Schwarz in 1898, by Mr. R. E. Kunze in 1897 and 1898, and a few by Cockerell and by Morse. The dragon-flies and ant-lion flies are not included. The total number is about 40 species; especially complete is the series of Chrysopidæ and Hemerobiidæ. The other groups are poorly represented.

Most of the species from Williams show close affinity to the Colorado fauna, but there are distinct indications of relation to the fauna of Southern California. A number of species are known to occur in Mexico, and one of these was not previously known from the United States. Two species have not been determined specifically.

The species most abundantly represented, and therefore probably the most common, are *Callibætis undata*, *Chrysopa californica*, *Eremochrysa punctinervis*, *Micromus variolosus*, and *Hemerobius perparvus*. These are typical southwestern species, none of them being known from the eastern States.

Order ARCHIPTERA.

Family PSOCIDÆ.

Psocus conspersus, n. sp.

Dark brown or nearly black, head dull; legs pale brownish; antennæ brown, pale at base. Wings hyaline; pterostigma brown, venation mostly brown, hind margin with two brown or black spots, one before the middle, the other close to the base; another spot near base of the closed cell in middle of wing; elsewhere the wing is sprinkled with minute dark dots, none, however, very close to the margin; hind wings unmarked, venation brown. Antennæ quite long and slender, front of head swollen. Wings moderately long; pterostigma rather large, rounded behind; the closed cell quadrangular, as wide at base as at the tip, nearly twice as long as broad.

Length, 3 mm.

A few specimens from Williams, July 24 and 27.

Type.—No. 6794, U. S. National Museum.

The National Museum also has specimens from Tucson, collected January 5 (Hubbard).

Psocus sp.

One specimen of a handsome species, related to *P. sparsus*, from Oracle, July 15 (Schwarz).

Family EPHEMERIDÆ.

Callibætis tessellata Hagen.

One specimen from Williams, July 16.

Callibætis undata Pictet.

Many specimens from Williams, June 16 to July 27.

Common in Mexico.

Tricorythus explicatus Eaton.

Several specimens from Copper Basin, July 8 (Oslar).

Previously known from Sonora and Vera Cruz, Mexico.

Callibætis sp.

One female from Catalina Springs, May 4 (Schwarz), appears to belong to another species.

Order NEUROPTERA.

Family SIALIDÆ.

Chauliodes filicornis, n. sp.

Dull black; vertex with some shining scars; antennæ pale yellowish brown, with black hair. Legs brownish, blacker toward tip; abdomen brownish, last segment black, above shining. Wings densely fimbriate with brown, more heavily at pterostigma, and a black band near base of wing from the radius back to the anal vein; a rather large brown spot between radial sector and median vein behind the pterostigma; venation brown, interrupted with whitish. Hind wings much less heavily marked, except in the costal region. Structure similar to *C. angusticollis* Hagen. Antennæ moniliform, long and slender, each joint with a circle of black hair around middle.

Length to tip of wings, 44 mm.

Type.—One male from Jerome, June 24 (Oslar), in the collection of the author.

Differs from *C. angusticollis* in color of head, markings of wings, shape of genitalia, and larger size.

There is a female in the National Museum collection from Pine Cañon, Chiricahua Mountains, collected by Mr. H. G. Hubbard on June 29.

Corydalid cognata Hagen.

Several specimens from Phoenix and Rio Verde (Oslar).

Previously known from New Mexico. There are also specimens in the National Museum from Phoenix, Ariz., collected by Mr. Kunze in April, May, June, July and August.

Family RAPHIDIIDÆ.

Raphidia assimilis Albarda.

Williams, May 26 to July 23; Catalina Springs, April 22 (Schwarz).

Occurs also in Colorado.

Raphidia minuta, n. sp.

Blackish, mandibles yellowish, basal joints of antennæ pale, anterior part of prothorax rather more reddish; legs pale yellowish; wings hyaline, pterostigma bicolored. Antennæ rather short and fine, prothorax narrowed in front and slightly constricted before the middle; its length scarcely more than the head. Ovipositor as long as abdomen; male genitalia very prominent and distinct. Wings with three cells beneath the pterostigma as in *R. bicolor*, and in other ways much like this species: only six cross-veins in costal region.

Length to tip of wings, 11-14 mm.

Specimens from Williams, June 10 (type) to July 17; Flagstaff, July 5; also from Las Vegas Hot Springs, New Mexico, August 6.

Type.—No. 6795, U. S. National Museum.

Family MANTISPIDÆ.

Mantispa sayi Banks.

One specimen, Williams, June 16; another, Hot Springs, June 28.

Previously known from Florida and Texas.

Symphysis signata Hagen.

Two specimens from Hot Springs, June 27. Also from Santa Rita Mountains, July 7 (Schwarz).

This is a distinctly southern form, occurring in southern California and in Mexico.

Family CHRYSOPIDÆ.

Eremochrysa punctinervis McLachlan.

Many specimens from Williams, May 29 to July 15; Oracle, July 5 (Schwarz); San Simon, July 6 (Hubbard); Winslow, July 31; Catalina Springs, April 18, May 9 (Schwarz).

A distinctly southern species, occurring from Texas to California.

Chrysopa schwarzi Banks.

One from Prescott, April 10 (Osler).

The type is from New Mexico.

Chrysopa coloradensis Banks.

Williams, July 22 and 25.

Abundant in Colorado.

Chrysopa sabulosa Banks.

One from Prescott, April 7 (Osler).

The type is from Colorado.

Chrysopa chlorophana Burmeister.

Bright Angel, July 12; Flagstaff, July 5; Prescott, April 4 (Osler).

A species of the northern States.

***Chrysopa arizonensis* Banks.**

Yuma (Morse). This is the type specimen.

***Chrysopa externa* Hagen.**

Williams, July 28 and 29; Hot Springs, June 26; Flagstaff, July 6; Ft. Grant, July 16 (Hubbard).

***Chrysopa californica* Coquillett.**

Williams, July; Winslow, July 31; Chiricahua Mountains, July 1 (Hubbard); Tucson, April 29 and July 20 (Schwarz); Prescott, June 26; Buckeye (Cockerell); Tempe, March 28 (Cockerell); Catalina Springs, May 9, and Santa Rita Mountains, June 8 and 14 (Schwarz).

Common in the West.

***Chrysopa erythrocephala* Banks.**

One from Bright Angel, July 12.

A western species.

***Chrysopa rufilabris* Burmeister.**

One from Williams, July 24.

An eastern species. This specimen does not appear to differ from typical examples.

Family HEMEROBIIDÆ.

***Polystæchotes punctatus* Drury.**

From Williams, July 29 and 30; Salt River, April 17 (Osler).

Distributed throughout the United States.

***Megalomus latus*, n. sp.**

Head pale brown, antennæ rather paler; thorax darker brown, abdomen brown; legs yellowish. Wings hyaline, veins densely dotted with brown; around the margin dark spots alternate with pale; first gradate series marked with black, second curved and less distinct; a rather large blackish spot on the middle of hind margin. Hind wings hyaline, costal area and apical venation brown; also two brown spots on hind margin. Fore wings very broad, especially the costal area at base; five or six radial sectors, the first soon forked; veins very close together; first gradate series straight, oblique; second curved, following the outline of wing. Nearly all the costal veinlets before pterostigma are forked. In hind wings there are four branches of the radial sector; the costal cross-veinlets are very numerous.

Length of body, 8 mm.; expanse, 18 mm.

One specimen from Williams, July 24.

Type.—No. 6796, U. S. National Museum.

There are also specimens in the Barber & Schwarz collection from Las Vegas Hot Springs, New Mexico.

***Berotha occidentalis* Banks.**

Two from Santa Rita Mountains, May 31, and Oracle, July 15 (Schwarz).

Occurs also in Nevada.

Micromus variolosus Hagen.

Many from Williams, May 30 to July 29; Hot Springs, June 26; Prescott, June 19; Flagstaff, July 2 to 5; Winslow, July 31; Santa Rita Mountains, June 1; (Schwarz); Chiricahua Mountains, June 9 (Hubbard).

Common in the West.

Hemerobius mæstus Banks.

One from Williams, July 29.

Also common in the West.

Hemerobius coloradensis Banks.

Several from Bright Angel, July 13; Williams, May 28 to 30.

Hemerobius pacificus Banks.

One from Williams, May 27.

Occurs also in Washington.

Hemerobius transversus Banks.

One from Williams, July 24.

Occurs also in Colorado.

Hemerobius schwarzi, n. sp.

Face shining black; vertex and antennæ pale yellowish; pronotum and rest of thorax pale, a black band across front of mesothorax, indistinct dark spots above on meso- and metathorax. Abdomen brownish; legs pale yellow. Wings very pale yellowish hyaline, the main veins lightly spotted with black, but the margin of wing unmarked. The first gradate series broken, the posterior part and the median part clouded with brown, so that each wing appears to have two brown spots near middle; in hind wings the veins all pale and unmarked. In fore wings the median is not bent toward cubitus, so that the basal cross-veins there are of sub-equal length. In the hind wings the first fork of the radial sector is as far out as the fork of median vein.

Length of body, 8 mm.; expanse, 19 mm.

One specimen from Williams, July 23.

Type.—No. 6797, U. S. National Museum.

It has also been taken at Mesilla, New Mexico.

Hemerobius barberi, n. sp.

Head pale yellowish; antennæ pale, marked with black near base and tip as in allied species; thorax pale, darker on sides; abdomen brownish; legs pale yellow. Wings pale; the fore wings finely and evenly irrorate with light brown, except the base is paler and there is a larger patch near middle of hind margin, and one in anal area. The venation is pale, with brown dots, and there are white spots along the margin. The hind wings are hyaline, with pale venation, except that around the margins is more brownish. The fore wings are rather long and narrow, longer than in allied species, and the costal area is broad at base; there are but two radial sectors.

Length of body, 3.5 mm.; expanse, 11 mm.

Two specimens from Williams, July 20 and 21.

Type.—No. 6798, U. S. National Museum.

A specimen from Los Angeles, California, appears to be the same species.

Hemerobius perparvus McLachlan.

Several examples from Williams, May 28; Bright Angel, July 12 to 17; Oracle, July 9 (Schwarz).

This species is common from Texas to California.

Hemerobius umbratus, n. sp.

Dark shining brown; abdomen rather paler brown: antennæ and legs pale yellow. Fore wings uniformly dark brown; hind wings nearly hyaline, except the brown costal streak; all venation brown, unmarked. In structure similar to *H. occidentalis* Fitch; the first sector of radius connected to lower fork of the second sector, the first sector not being forked till near tip of wing. The costal area is quite broad at base.

Length of body, 3.5 mm.; expanse, 10 mm.

One specimen from Williams, June 10.

Type.—No. 6799, U. S. National Museum.

Readily distinguished from all other species by the uniform dark colored fore wings. I have what is probably the same species from New Mexico, but the specimen is not in good condition.

Family CONIOPTERYGIDÆ.

Coniopteryx sp.

Specimens from Williams, May 29; Ashfork, June 18.

Order TRICHOPTERA.

Family SERICOSTOMATIDÆ.

Helicopsyche sp.

One specimen from Santa Rita Mountains, June 15 (Schwarz).

Probably new, but closely related to *H. californica*.

Family LEPTOCERIDÆ.

Leptocella minuta Banks.

Two from Hot Springs, August 21, appear to be identical with the type from Pullman, Washington.

Family RHYACOPHILIDÆ.

Chimarrha angustipennis, n. sp.

Black; legs pale, spines dark; wings fumose, with black venation. Very similar in structure to *Ch. aterrima*, but both pairs of wings are narrower than in that species; the closed discal cell is plainly shorter and the forks are longer than in that species. Otherwise the species are very close to each other.

Length, 5 mm.; expanse, 11 mm.

Several specimens from Hot Springs, June 21 and 22.

Type.—No. 6800, U. S. National Museum.

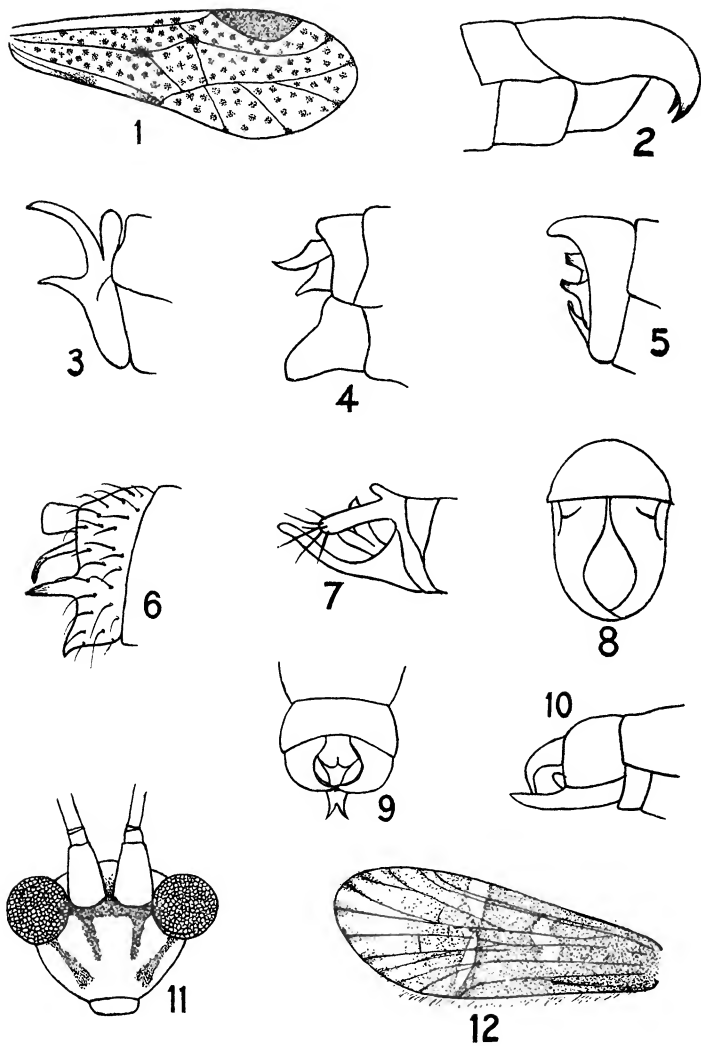


PLATE IV.

Family HYDROPSYCHIDÆ.

Polycentropus, sp.

Four specimens from Santa Rita Mountains, May and June (Schwarz).

It is probably a new species.

Hydropsyche divisa, n. sp.

Head black; face with silvery hair; vertex with erect black hair; behind with white hair; antennæ brown, ringed with white; thorax black, with appressed white hair in the middle; abdomen brown; legs pale yellowish, darker above at tips of tibiæ, and the tarsi often marked with brown; spurs yellow. Wings brown, marked with some small white patches; just before the pterostigma is a white band extending back to the median vein, broadest on the costa; and from the arculus there extends forward a narrow curved white band, nearly touching the other one, so that the wing is nearly divided by a white band beyond the middle. Sometimes there are indications of another white band half way from this one to the base. Beyond the band the wing is paler than before, with more pale hairs. The fringe around the tip is blackish at tips of veins and yellowish between. Hind wings are fumose, with blackish fringe and venation.

Structure similar to other small species; the hind tibiæ are sparsely fringed on the posterior side.

Length, 7 mm.

Several specimens from Salt river, April 10 (Osler).

Type.—In the author's collection.

Family LIMNEPHILIDÆ.

Anabolina, n. gen.

A Limnephilid; peculiar in that the female has but three spurs on the hind tibiæ, while the male has four; a condition unknown so far in this family. Three spurs on middle tibiæ. Anterior wings rather slender, lightly rounded at tip; in hind wings the fourth apical cell is narrow at base, the fifth quite broad; the discal cell rather longer than apicals. In fore wing the discal cell is very long; the pterostigma is quite distinct, and the radial vein is bent close by. Ocelli moderately large; two transverse warts on vertex; basal joint of antennæ rather short; prothorax extremely short; anterior tarsi of male not elongated.

Type: *A. diversa* Banks.

In the present condition of the classification of the Limnephilidæ this must be a separate genus; but the spur formula is not a sure criterion and I hope it may soon be displaced by some better character, drawn perhaps from the chætotaxy of the head and thorax.

Anabolina diversa, n. sp.

Face pale, with golden hair, and black bristles on the sides; vertex brownish, with some short white hairs, a few black bristles behind each

antenna and a wart on each side of vertex bearing a row of black bristles. Thorax with a broad white stripe in middle, dark brown on the sides; pleuræ yellowish; abdomen brown above, paler beneath. Antennæ pale yellowish brown; legs rather paler, with many black spines; spurs yellowish. Wings hyaline, with gray hairs; venation pale, irregularly marked with brown, the cubitus and anal more heavily marked; pterostigma rather distinct. Hind wings gray hyaline, venation brownish, a brown dot in base of third apical cell; fringe short and brown in both pairs.

Length, 16 mm.

Several specimens, Prescott, June 19 to 25 (Osler).

Type.—In the author's collection.

EXPLANATION OF PLATE IV.

1. *Psocus conspersus*, wing.
2. *Hemerobius schwarzi*, male appendages.
3. *Hemerobius cockerelli*, male appendages (inverted).
4. *Hemerobius perparvus*, male appendages.
5. *Anabolina diversa*, male appendages.
6. *Hemerobius umbratus*, male appendages.
7. *Raphidia minuta*, male appendages.
8. *Hemerobius pacificus*, male appendages.
9. *Chauliodes filicornis*, appendages, top view.
10. *Chauliodes filicornis*, appendages, side view.
11. *Chrysopa schwarzi*, head.
12. *Hydropsyche divisa*, wing.

THE GENERA OF THE DIPTEROUS FAMILY EMPIDIDÆ, WITH NOTES AND NEW SPECIES.

By D. W. COQUILLET.

The present paper is an attempt to settle the type species of each North American and European genus of Empididæ, and to bring some kind of system out of the present confused condition into which the genera of this family have fallen. Our own fauna is so similar to that of Europe that our students cannot well afford to ignore the latter when working with specimens from this country. Of the generic names adopted in the synoptic table given in my Revision of the North American Empidæ, comparatively few changes are necessary; thus *Hemerodromia* includes more than one genus, and this is also true of *Tachydromia*; *Mantipeza* gives way to *Chelifera*, a much older name; *Rhamphomyia* gives place to the much earlier *Macrostomus*, as *Sciodromia* does to the earlier *Helcodromia*; *Syneches* is replaced by the much earlier *Acromyia*, as *Cyrtoma* is by the earlier *Bicellaria*.

In regard to the earliest date of each genus, the rule has been